Monte Vista Refuge's Pilot-less Project to Survey Cranes

By Floyd Truetken

A multi-agency project last spring at Monte Vista National Wildlife Refuge in southern Colorado pioneered the use of unmanned aerial drones to survey sandhill crane populations.

Sandhill cranes are large, spectacular, awe-inspiring birds. Many birders know of the cranes' migration through Nebraska each spring. A lesser-known migration occurs in the Rocky Mountains. Each spring as many as 24,000 cranes stop at Monte Vista Refuge, where they congregate in meadows to feed and replenish critical fat reserves en route to nesting grounds in Montana, Idaho, Utah and Wyoming.

To track the health of the species and establish guidelines for hunting season bag limits, the U.S. Fish and Wildlife Service measures the crane population using aerial and ground surveys.

At Monte Vista Refuge, the U.S. Geological Survey for the first time used a small, unmanned, hand-launched RQ-11A Raven aircraft to survey cranes. The Raven uses thermal, infrared or traditional daytime videography imaging to "film" low-level targets, such as flocks of birds on a refuge. USGS obtained the Raven from the Army under a memorandum of agreement. The project was overseen by a team of 20 individuals that included USGS staff, the Department of the Interior Aviation Management Directorate, current and retired Service biologists and refuge staff.

Before the experiment could begin, a major hurdle had to be cleared. The Federal Aviation Administration had never authorized drone flights for wildlife surveys. To enable the low-level, 400-foot-above-ground-level (AGL) flights to go forward, the FAA would need to waive its advisory requiring flights over refuges to be at least 2,000 feet in altitude. After months of planning by the team, the FAA approved "proof of concept" daytime-only flights.

Monte Vista Refuge then issued a special use permit authorizing the USGS to conduct flights to determine the Raven's suitability for use in crane population surveys. The team selected the peak period for cranes at the refuge, March 19-27, as the optimal time for flight operations. But two concerns remained.

Mark Bauer of the U.S. Geological Survey prepares an unmanned RQ-11A Raven aircraft for launch as part of a project to survey sandhill crane populations at Monte Vista National Wildlife Refuge in Colorado. (Floyd Truetken/USFWS)

The first was visitor safety. To minimize risk, Raven flights were conducted only in areas closed to the public; refuge law enforcement closely controlled access.

The second concern was for the birds. Because cranes react immediately to low-flying raptors and eagles, which are common in spring, biologists speculated that daytime low-level Raven flights would cause the cranes to flush. If such flights had consistently frightened birds from feeding and roosting areas, the project would have been a "no-deal." Fortunately, several mid-day test flights at altitudes from 100 to 400 feet AGL showed no consistent adverse crane reaction. The biologists were satisfied that potential benefits of the survey technique far outweighed minimal disturbance to the cranes.

After two days of more testing/operator training, early morning flights were conducted over crane roosting sites. Using the thermal-imaging camera, the Raven easily picked up heat signatures from roosting groups, and, in the dawn hours, the cranes showed absolutely no reaction to the drone. After software stitched imagery together, Raven crane estimates were compared to a ground count performed by Service biologists. At one roost, biologists counted 2,692 cranes, while the Raven imagery showed 2,567—a difference of just 4.6 percent.

The flights were successful on many levels. They were the first unmanned drones approved by the FAA for the Interior Department. They demonstrated the technology's potential to support highly accurate biological surveys in a safe, cost-effective manner. They laid the groundwork for refining survey techniques and securing future FAA approval to conduct flights at night, when cranes roost in tighter groups.

The Raven and similar unmanned aerial vehicles hold great promise not only for wildlife censuses but also for wetland delineation and easement enforcement, drug interdiction and detection, and monitoring of remote areas.

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